INVESTIGATOR'S ANNUAL REPORT

National Park Service

All or some of the information provided may be available to the public

Reporting Year: 2002	**Park:** Shenandoah NP
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No co-investigators

Permit#:
SHEN-2002-SCI-0016

Park-assigned Study Id. #:
SHEN-00276

Project Title:
Management Considerations for Rock Outcrop Barren Communities on three Peaks in Shenandoah National Park

Permit Start Date: Jun 10, 2002	**Permit Expiration Date** Aug 30, 2002
Study Start Date: Jun 10, 2002	**Study End Date** Aug 30, 2002

Study Status:
Completed

Activity Type:
Research

Subject/Discipline:
Ecology (Aquatic, Marine, Terrestrial)

Objectives:

-Inventory the species composition, percent plant cover/lichen cover/bedrock cover, and substrate characteristics of two rare outcrop barren plant communities in Shenandoah National Park. (High Elevation Greenstone Barren communities and Acidic Pavement Heath Barren communities)

-Delineate and map these outcrop areas

-Inventory the condition of 13 rare plant (RTE) species within 100m of the two outcrop communities

-GPS the locations of all rare plant populations within 100m of the outcrop communities

-Determine the types and extent of human use on these sites

-Map intensively-used visitor day-use areas, camping areas, trails, and social trails

-Assess the amount of interaction and the spatial location of interactions between human use areas and rare plant communities

-Develop Levels of Acceptable Change indicators & standards for these rock outcrops such that a monitoring protocol is established and that monitoring will be linked with a suite of management options to maintain and improve the condition of these areas.

-Develop a list of management recommendations for use in park planning to reconcile the need to protect these rare communities/rare plants with the need to allow for continued visitor access.

Findings and Status:

Field work completed august 2002. Final report submitted January 2003.

This study examined the current condition of two natural communities in Shenandoah National Park. Both of these communities are globally rare and include at least nine state-listed rare plant species in just 4.6 acres. High-elevation Greenstone Barren communities are found in a few locations in the Park including, Stony Man Mt., Hawksbill Mt. and Little Stony Man Cliffs, the subject of this study. Old Rag Mt., the only example of the Acidic Pavement Heath Barren community in the Park, was also included. The study was initiated under concern for the ongoing protection of natural resources at these sites which are under pressure from the considerable visitation that these areas receive. This work summarizes the current condition of these two rare plant communities in terms of community composition and structure. It identifies the locations of all rare plant populations and human use areas within the study sites, and addresses the spatial relationship between the rare plants and visitors. It then makes recommendations on how to maintain the integrity of these plant communities into the future.

High-elevation Greenstone Barren communities are found on the Catoctin formation, a metamorphosed basalt, called greenstone. They are found above 900m elevation and are characterized by large areas of exposed and lichen-covered rock. These sites are harsh for plant growth in their limited soil development, xeric conditions, and extreme weather conditions. They contain eight state-listed rare plant species, many of which are northern, boreal species at the southern extent of their range. The Acidic Pavement Heath Barren community, found on granite bedrock on Old Rag Mt., is also characterized by harsh weather, xeric conditions, limited soil, and high elevation.

Rare plants on greenstone outcrops tend to grow in soil and have greater percent coverage there. Study plots containing rare plant species include less exposed rock and have deeper soils. The rare plant species found on granite outcrops, Minuartia groenlandica, is found growing in gravel substrate which is more abundant in the human use area.

Today the Park hosts an average of 44,000 visitors in the summer and fall months on Old Rag, and between 11,000 and 21,000 calculated visitors on Hawskbill, Stony Man, and Little Stony Man during the same time. These users engage in hiking, camping, and rock-climbing at these sites.

Users are impacting greenstone sites by trampling soil and vegetation. They have increased the amount of exposed rock inside the visitor use area, and decreased the total plant cover. Fewer rare plants are found inside the visitor use area. Visitors are cutting informal social trails throughout the outcrops. Many of these lead to the base of rock climbing routes; others cut through rare plant habitat. Campsites, found near Little Stony Man Cliffs, are enabling visitors to trample more remote outcrops in that area. These remote outcrops are increasingly being used as picnicking spots for campers staying at nearby campsites.

It is clear that sites on Old Rag, Little Stony Man, Stony Man, and Hawksbill are receiving considerable visitation and that this visitation is having a significant impact on the quality of the resource.

Total plant percent cover, percent exposed rock, and percent lichen cover were selected as Limits of Acceptable Change (LAC) indicators for these two outcrop communities. These measures operationalize the desired condition. They form two different standards for different parts of the outcrops. The high standard area controls 56% of the total outcrop and visitor use area but includes 92% of rare plant cover in that area.

The report describes a desired condition that balances conflicting goals and includes management recommendations to maintain this condition.

For this study, were one or more specimens collected and removed from the park but not destroyed during analyses?

No

Funding provided this reporting year by NPS:	**Funding provided this reporting year by other sources:**
0	0

Fill out the following ONLY IF the National Park Service supported this project in this reporting year by providing money to a university or college

Full name of college or university:	**Annual funding provided by NPS to university or college this reporting year:**
University of Vermont, Field Naturalist Program	5000